CNR - Istituto per lo Studio degli Ecosistemi
I.S.E.
Verbania Pallanza

National Research Council

Institute of Ecosystem Study

Review and approval of the doctoral thesis
"Modeling the recovery of anthropogenically acidified mountain waters"
by David W. Hardekopf

This thesis is based on five papers concerning the present status and modelling the future evolution of mountain rivers and lakes in the Litavka and Tatra Mountains, in relation to the long-range effects of air pollution: nutrient and acid deposition and climate change.

The author deals with this complex subject combining the observation of chemical and biological indicators and dynamic modelling, successfully decoupling the effects of the different human pressures on these water bodies.

In the first two papers, the current status of the studied rivers and lakes is fully described on the basis of a careful research design and is discussed using up-to-date numerical techniques.

The methods used and the discussion are exhaustive and form the basis of the following papers, in which the author explores the possibility to use dynamic models to understand and forecast the evolution of the studied water bodies. Among the number of available models, it can be noted the choice of the MAGIC model was the best compromise between data ability and model precision, and I fully agree on the opportunity to use a mature, internationally tested, model rather than develop a new tool.

However, the author did not only correctly apply the MAGIC model, but he careful validate it using present and past data making possible to evaluate error precision and accuracy, thanks to the careful choice of the study sites and the interesting recover of precious historical data.

The inclusion of climatic effects on the MAGIC model was performed in the framework of a relatively large international team, within an European research project,

Largo Tonolli, 50 – 28922 VERBANIA PALLANZA (VB) Tel. +39 0323 518300 Fax: +39 0323 556513
CF 80054330586 P. IVA 02118311006

showing the ability of the author to integrate his activity in an international context and to take from it the opportunity to improve the discussion of his own data.

However it is in the last article that the originality of the author's work appears: comparing the benthic communities and the model predictions in two close rivers, of contrasting acid status, he was able to make the link between the prediction of the chemical evolution of the rivers and the response of their benthic communities, opening the possibility to forecast the future biological response of those water bodies.

Finally, an attempt was done to link deposition- and climate-driven changes with the effects of changes in the land use in river catchment, and to the interaction between land use and climate. In my opinion a more detailed discussion on the effects of potential management choices for the recover of biological and chemical quality of these water bodies can still be obtained form the author's results, but it would probably require the collection of accurate socio-economic information well beyond the scope of this thesis.

In conclusion, I deem that the research activity which led to the compilation of this thesis meets the requirements of high quality and innovative approach, and I'm pleased to approve it.

Verbania Pallanza, June 9th, 2008

dr. Aldo Marchetto